

VAGINELLA TRICUSPIDATA SP. NOV., A NEW HOLOPLANKTONIC MOLLUSC FROM THE LATE OLIGOCENE OF SW FRANCE AND HUNGARY

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Amongst the holoplanktonic molluscan species from the Late Oligocene (Chattian) 'Marnes de St. Etienne-d'Orthe' (southern Aquitaine Basin, France) occurs a peculiar species of *Vaginella* which is characterised by possessing three denticles at the dorsal apertural margin, a feature not yet described for any vaginellid species. This species was subsequently found to occur in Late Oligocene (Egerian) deposits in the Mucsony-136 borehole in Hungary (Borsod Basin), thus enabling interregional correlations; this attribute is the reason for the present description, in anticipation of a future treatment of the entire holoplanktonic molluscan fauna of the 'Marnes de St. Etienne-d'Orthe'.

Key words — Holoplanktonic molluscs, Euthecosomata, *Vaginella*, new species, Aquitaine Basin, Paratethys, Late Oligocene, interregional correlation.

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INTRODUCTION

The 'Marnes de St. Etienne-d'Orthe' occur in the well-known, E-W running, Cainozoic palaeocanyon, in the southern part of the Aquitaine Basin (SW France). Otoliths collected from these deposits were described by Steurbaut (1984), who assigned a latest Oligocene (Chattian) age to this deposit. The calcareous nannoflora indicates zone NP25¹ (Steurbaut, 1984).

¹ Dr E. Steurbaut (*in litt.*, 28 October 1992) presented the following note on the nannoflora occurring in a sample from locality 1 (see 'Localities' below):

General characteristics — About 60% of the assemblage consist of reworked forms (mainly Late Cretaceous, to a lesser degree also Palaeocene and Late Eocene), indicating an extensive erosion of an adjacent area of complex tectonic structure (Pyrenees). Amongst autochthonous species especially the genera *Ericsonia*, *Reticulofenestra* and *Helicosphaera* are well represented.

Represented autochthonous index species — *Reticulofenestra floridana* (dominant), *R. abisecta* (frequent), *R. bisecta* (rare), *Ericsonia fenestrata* (rare), *Helicosphaera euphratis* (rare), *H. obliqua* (rare), *H. recta* (rare), *Zygrhablithus bijugatus* (rare) and *Pontosphaera enormis* (rare).

Absent index species — *Sphenolithus distensus* and *S. ciperoensis*.

Biozonation — This assemblage is referred to standard calcareous nannoplankton zone NP25 [defined by Martini, 1971: interval between LO (= last occurrence) of *S. distensus* and LO of *H. recta*] on the following grounds: absence of *S. distensus*, presence of *H. recta*, *R. bisecta* (ranging to the top of NP25), *Z. bijugatus* (ranging to the top of NP25), and *P. enormis* (restricted to NP25) (data compiled from Martini & Müller, 1986).

Remarks — The assemblage differs slightly from other Late Oligocene NP25 assemblages of the Aquitaine Basin, e.g. by the absence of *S. ciperoensis* (which does occur e.g. at the Peyrière locality). The disappearance and re-entry of this species within zone NP25 has already been noted in deep sea cores from the Indian Ocean.

baut, pers. comm.), which agrees well with the results obtained from the otoliths.

Some larger molluscan species from these marls at St. Etienne-d'Orthe were described by Peyrot (1925-1935), but the greater part of the molluscan fauna consists of small to very small species which have so far not been studied in detail. A fairly extensive collection of these molluscs is housed in the National Museum of Natural History (Leiden), stemming from several outcrops of the 'Marnes de St. Etienne-d'Orthe' at the type locality and its vicinity.

Several species of holoplanktonic molluscs occur, most of which are new to science. A single species, *Spoelia torquayensis*, has recently been described, as it was found to occur also in Australian pteropod faunas (A.W. Janssen, 1990a, p. 42). A major disadvantage of the pteropod material from the St. Etienne-d'Orthe marls is the fragmentary state of preservation of most specimens. Initially the vaginellid species described below was found as fragments only in sieving residues. Fragments of the typical apertural margin with the three denticles, as well as fragments of adapical parts, including the protoconch, were found. Such fragments could not be recognised without doubt to belong to a single species, although the species composition of the holoplanktonic molluscan fauna did not leave many alternative interpretations.

A special collecting trip was made in September 1990 in order to obtain better-preserved material. A number of specimens preserved on slabs of clay were collected, proving the initial view that all these fragments do indeed belong to one and the same species. Careful preparation of the extremely fragile specimens has subsequently demonstrated convincingly that they represent a single species: a vaginellid with a slender shell and a remarkable morphology of the aperture.

Recently the same species has been recognised in a sample from borehole Mucsony-136, sunk in the Borsod Basin, northeast of the Bükk Mountains (NE Hungary). A first indication of the occurrence of pteropods in this borehole was given by Báldi & Radócs (1965). They recorded *Vaginella* sp. from the Late Oligocene Molluscan Clay, which, on the basis of the macrofauna contained, they found to be of the same type as the clays at Eger and Novay, the later holostratotype and facies stratotype of the Egerian Stage. In the uppermost part of the Molluscan Clay at Eger the base of nannoplankton zone NN1 was documented (Báldi *et al.*, 1975).

Báldi & Radócs (1971) mentioned *Vaginella* cf. *lanceolata* (Boll, 1846) from the above-mentioned borehole (depth: 384-500 m). Later, Báldi (1973) returned to the original identification as *Vaginella* sp.

The sample concerned, still labelled *Vaginella* cf. *lanceolata*, (depth: 430 m) is housed in the collections of the Museum of Natural Sciences in Budapest; it is a clay slice of the cored section, showing on one side a number of slender vaginellids. Subsequent preparation has revealed the presence of the typical apertural denticles in several specimens (Pl. 1). Protoconchs could not be found in the Hungarian sample, the preservation of which is even less favourable than that of the French material.

The nannoplankton of this Hungarian sample was studied by Dr. M. Báldi-Beke, who found (pers. comm.) that the nannoflora is very poor, but typically Oligocene. The sample yielded many reworked Cretaceous species, which is a typical phenomenon in the Eger Formation of the Borsod Basin. The sample can be assigned to nannoplankton zone interval NP24-25, which indicates Late Oligocene. This is in good agreement with Báldi & Radócs's (1971) findings, who considered the Molluscan Clay of the Eger Formation to be of Early Egerian age, which in the Paratethys area is the counterpart of the Chattian Stage.

LOCALITIES

The material discussed below was collected at the following localities:

— France (dept. Landes); Chattian, Marnes de St. Etienne-d'Orthe.

1. St. Etienne-d'Orthe, outcrop in banks and bed of the Ruisseau de l'Église, east of Lartigaou, co-ordinates x = 316,500, y = 149,150, leg. A.W. Janssen, July 1984, August 1986 and September 1990.
2. St. Etienne-d'Orthe, outcrop in bank of Ruisseau de l'Église, Casenave, co-ordinates x = 316,750, y = 149,350, leg. A.W. Janssen, September 1990.
3. St. Etienne-d'Orthe, Hondelatte, outcrop in banks and bed of small stream, just downstream of remains of former barrage, co-ordinates x = 317,450, y = 148,800, leg. A.W. Janssen, September 1990.
4. St. Etienne-d'Orthe, Ruisseau Verdun, leg. P.

Lozouet et al. (material in collection of the Muséum national d'Histoire naturelle, Paris).

— Hungary (Borsod Basin); Egerian, Eger Formation, Molluscan Clay.

5. borehole Mucsony-136, depth 430 m (stored in the collections of the Museum of Natural Sciences, Budapest, unregistered).

SYSTEMATIC PART

Phylum	Mollusca
Class	Gastropoda
Order	Thecosomata
Suborder	Euthecosomata
Family	Cavoliniidae
Subfamily	Cavoliniinae
Genus	<i>Vaginella</i> Daudin, 1800

Type species (by monotypy) — *Vaginella depressa* Daudin, 1800.

***Vaginella tricuspidata* sp. nov.**

Pl. 1; Pl. 2, Figs 1-5; Pl. 3; Pl. 4, Figs 1-5

- v. 1965 *Vaginella* sp. — Báldi & Radócs, p. 311.
 v. 1971 *Vaginella* cf. *lanceolata* (Boll, 1846). — Báldi & Radócs, p. 133, tab. 1 (non *Belemnites lanceolatus* Boll).
 v. 1973 *Vaginella* sp. — Báldi, p. 95.

Diagnosis — A slender species of the genus *Vaginella* characterised by the absence of a preapertural constriction, by showing a non-deviating larval shell axis and by the presence of three denticles projecting from the dorsal apertural margin.

Derivatio nominis — *tres*, *tria* (L.): three; *cuspis* (L.): tip, cusp (occasionally also: *trident*).

Holotype — Pl. 2, Fig. 3, RGM 229 954.

Type locality — St. Etienne-d'Orthe (locality 2, as specified above), dept. Landes, France (southern Aquitaine Basin).

Stratum typicum — Marnes de St. Etienne-d'Orthe (Oligocene, Chattian), nannoplankton zone NP25.

Description — Shell medium-sized, elongate, transverse section almost cylindrical in the apical part, dorso-ventrally flattened towards the aperture, bilaterally symmetrical. In front view the apical part is slender conical, near to the apertural half of the shell the sides become parallel. There is no preapertural constriction, which is why the greatest width of the shell is at the aperture.

The protoconch's axis does not deviate from that

of the adult shell. The larval shell is separated from the teleoconch by a distinct constriction. Protoconch I is about one and a half times higher than wide and obtusely pointed at the apex. Separated by a weak constriction follows the somewhat larger, slightly inflated protoconch II, which is twice as high as wide. The larval shell does not demonstrate the dorso-ventral flattening which is often seen in vaginellid species.

At a short distance from the protoconch two weak lateral carinae develop. They gradually disappear at about mid-shell height. At the base of the carinae weak irregular wrinkles occasionally occur.

The aperture is elliptical, but widened in its middle part (apertural view). The dorsal apertural margin is slightly curved abapically and bears three equidistant denticles. The middle one of these frequently is somewhat wider than the two outer ones. Two weak folds parallel to the shell's axis run from the dorsal apertural margin in apical direction over a short distance.

The ventral margin is almost straight and therefore somewhat lower than the dorsal one. Close to the apertural margin the ventral side of the shell is very slightly inflated in the centre.

Because of the unfavourable state of preservation of most specimens the growth lines are barely visible. They run parallel to the apertural margins, at least in the younger half of the shell. They meet on the lateral carinae in a V-shape.

Material studied — Locality 1: numerous more or less defective specimens, on 22 slabs of clay (RGM 229 918-939); do., on 4 slabs of clay (Pl. 2, Figs 1-2, 4-5, RGM 229 940-943); 2 specimens on 2 slabs of clay (coll. Zorn), 2 specimens on 2 slabs of clay (coll. Muséum national d'Histoire naturelle, Paris); 140 fragments with (part of) apertural margin (RGM 229 944); 4 do. (Pl. 3, Figs 1-4, RGM 229 945-948); 2 do., (Pl. 4, Figs 4-5, RGM 229 958-959); 17 do. (coll. Zorn); 10 do. (coll. Muséum national d'Histoire naturelle, Paris); 29 fragments demonstrating lateral carina (RGM 229 949); 100 apical shell fragments (RGM 229 950); 3 apical shell fragments (Pl. 4, Figs 1-3, RGM 229 951-953); 10 do. (coll. Zorn), 10 do. (coll. Muséum national d'Histoire naturelle, Paris).

Locality 2: holotype (Pl. 2, Fig. 3, RGM 229 954) and 3 specimens on 4 slabs of clay (RGM 229 955). Sieving residues of this locality have not yet been sorted.

Locality 3: 10 fragments with (part of) apertural margin, 20 apical fragments (RGM 229 956).

Locality 4: 3 apical shell fragments (coll. Muséum national d'Histoire naturelle, Paris).

Locality 5: about 25 specimens on slab of clay (section of core), coll. Museum of Natural Sciences, Budapest.

RGM registration numbers refer to the collections of the National Museum of Natural History (Department of Palaeontology, Cainozoic Mollusca) at Leiden, The Netherlands (formerly Rijksmuseum van Geologie en Mineralogie).

In the collection of the Muséum national d'Histoire naturelle, Paris (malacology department) is a sample of six apical shell fragments from the Chattian of St. Paul-lès-Dax, Estoti outcrop. These differ from *V. tricuspidata* by a slightly wider apical angle and a somewhat more irregular shell. In the absence of distinctly recognisable specimens or fragments of the apertural shell parts at this locality we prefer to indicate these specimens as *V. cf. tricuspidata* for the time being.

Discussion — In the sieving residues of samples from St. Etienne-d'Orthe protoconchs of *V. tricuspidata* are easily confused with those of *Spoelia torquayensis* A.W. Janssen, 1990. Apical fragments in which the lateral carinae are not yet developed are virtually identical, in the shape of the larval shell as well as in the apical angle of the teleoconch, and they cannot be identified with certainty. We omitted such specimens from the list of studied material above. As soon as the carinae develop (in *Vaginella tricuspidata* somewhat earlier than in *Spoelia torquayensis*) the difference becomes clear: in *V. tricuspidata* the carinae are simple and not very sharp (Pl. 4, fig. 3), whereas in *Spoelia* they are bicarinate with sharp edges (compare Janssen, 1990, pl. 13, fig. 3). Furthermore in *Spoelia* the wrinkles at the base of the carinae are invariably absent; however, this may also be the case for some specimens of *V. tricuspidata*.

Another, fairly common pteropod species (compare Pl. 4, Fig. 6) also strongly resembles *V. tricuspidata* in the juvenile stage. This species has not yet been identified. Its protoconch characteristics are almost identical to those of *V. tricuspidata*, but the separation from the teleoconch is less distinct, and the teleoconch is considerably more slender. It is assumed that these are apical parts of a species of the genus *Styliola* Gray, 1850, which has not yet been found as complete shells. Fragments of adult shells demonstrating the oblique groove are present, however.

Well-preserved specimens of *Vaginella tricuspidata* cannot be confused with any other known species of this genus, because of the presence of the three characteristic denticles at the dorsal apertural margin. These cusps break off easily, but in their absence the very slender shell form lacking a pre-apertural constriction serves to distinguish this from most other vaginellid species. The very slender, mainly European Miocene species *V. lapugyensis* Kittl, 1886 has a regularly conical shell, whereas *V. victoriae* A.W. Janssen, 1990, described from the Australian Miocene, may be distinguished by its distinctly less slender apical part and the strong folds on both sides of the shell, near the apertural margins. The Late Oligocene North Sea Basin species *Vaginella chattica* R. Janssen, 1979 (= *Belemnites lanceolata* Boll, 1846, non von Schlotheim, 1813, nec J. de C. Sowerby, 1829) (compare R. Janssen, 1979, p. 351), with which the present species has been confused, can easily be distinguished by its utterly different outline, the relatively narrow aperture and the long apertural folds on both sides of the shell. An exceptionally well-preserved specimen of *V. chattica* is illustrated here in Pl. 2, Fig. 6, demonstrating also that the axis of the protoconch deviates from that of the teleoconch.

Plate 1

Vaginella tricuspidata sp. nov., paratypes

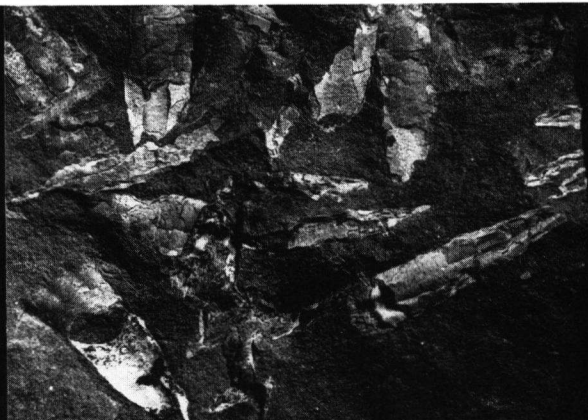
All specimens from the Mucsony-136 borehole (Hungary, Borsod Basin), depth 430 m below surface; Museum of Natural Sciences collections, Budapest.

- Fig. 1. Overall picture of all specimens, x 2.3
Fig. 2. Detail of Fig. 1, x 4.7.
Figs 3, 4. Specimens in dorsal view, showing apertural folds, x 9.4.
Fig. 5. Specimen in ventral view, x 9.4
Fig. 6. Apertural parts of two specimens in ventral view, showing denticles at dorsal apertural margin, x 15.
Fig. 7. Apertural part of specimen in ventral view, showing almost entire ventral apertural margin, x 15.

PLATE 1



1



2



3



4



5



6



7

CONCLUSIONS

The nannoplankton analyses of the French and Hungarian samples indicate that there is a fair agreement in age. In both cases the results point to a Late Oligocene age, in more precise terms (NP25) for the St. Etienne-d'Orthe material than for the Mucsony borehole sample (NP24-25).

Naturally, the presence of the new species of *Vaginella* described herein does not provide additional proof for a relative dating, but at least the Hungarian and French samples are roughly age-equivalent.

The stratigraphic distribution of *Vaginella tricuspidata* is still poorly known, but we may assume that it is not a long-ranging species. Apart from the three Hungarian records mentioned above, which in fact are all based on the same material as discussed in the present paper, it has apparently never been recognised, although the molluscan faunas of many European deposits of comparable age have been studied extensively. Thus this new taxon too is one of those pteropod species that are so useful in interregional correlations (see also A.W. Janssen, 1990b).

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wishes to thank in particular his assistant, Mr C.P. Barnard (Leiden, The Netherlands) for skilfully processing large amounts of sediment, and his wife, Mrs E. Janssen-Kruit, for her companionship and substantial assistance during various field trips in France. Finally, the authors want to thank Dr. P. Lozouet (Muséum national d'Histoire naturelle, Paris; malacology department) who allowed us to include his material in the present study.

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Plate 2

Vaginella tricuspidata sp. nov., holotype and paratypes

All specimens from St. Etienne-d'Orthe (Figs 1, 2, 4, 5: locality 1; Fig. 3, holotype: locality 2)

Figs 1-5. More or less compressed specimens preserved on slabs of clay, RGM 229 940-943, 229 954 (holotype), x 20; 1, 2: dorsal views, 3-5: ventral views.

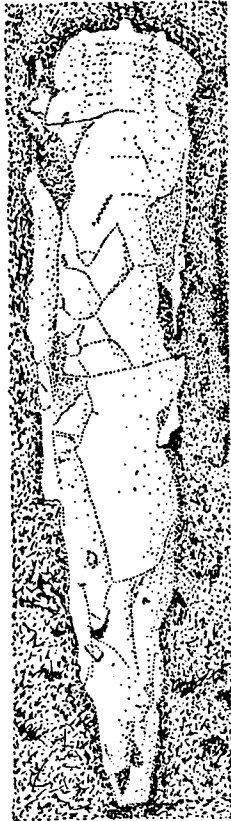
Vaginella chattica R. Janssen, 1979

Fig. 6. Segrahner Berg (Schleswig-Holstein, Germany), from boulder of 'Sternberger Gestein' (Late Oligocene, Chattian), leg. K. Eichbaum, 1966, don. F. Weinbrecht, RGM 229 957; 6a: dorsal view, 6b: right lateral view, x 20.

PLATE 2



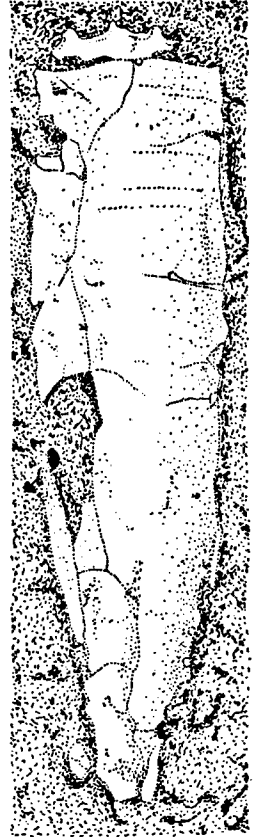
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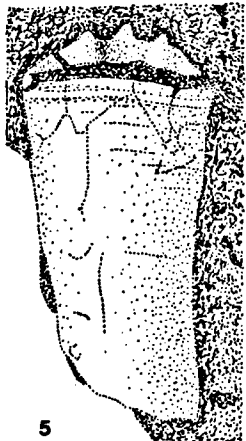
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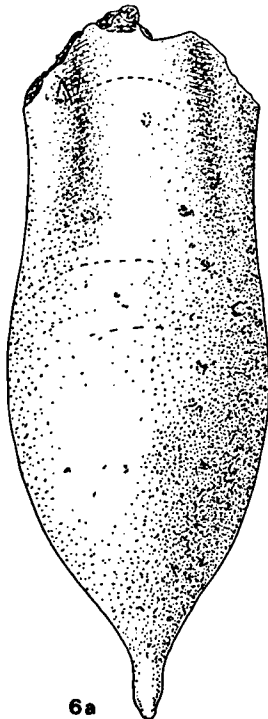
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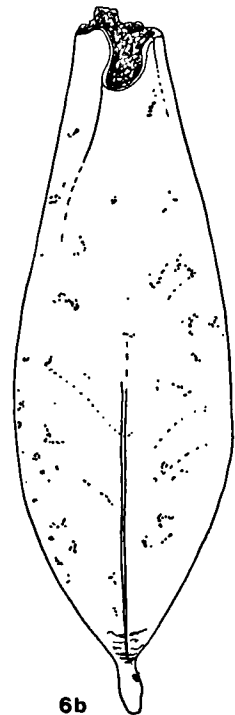
4



5



6a



6b

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- Manuscript received 15 September 1992, revised version accepted 2 November 1992.

Plate 3

Vaginella tricuspidata sp. nov., paratypes

All specimens from St. Etienne-d'Orthe (locality 1)

Figs 1-4. Fragments retaining dorsal apertural margin, RGM 229 945-948; 1, 2: external views, x 40; 3: internal view, x 40; 4a, b: external views of same fragment, x 40 and x 240, respectively.

PLATE 3

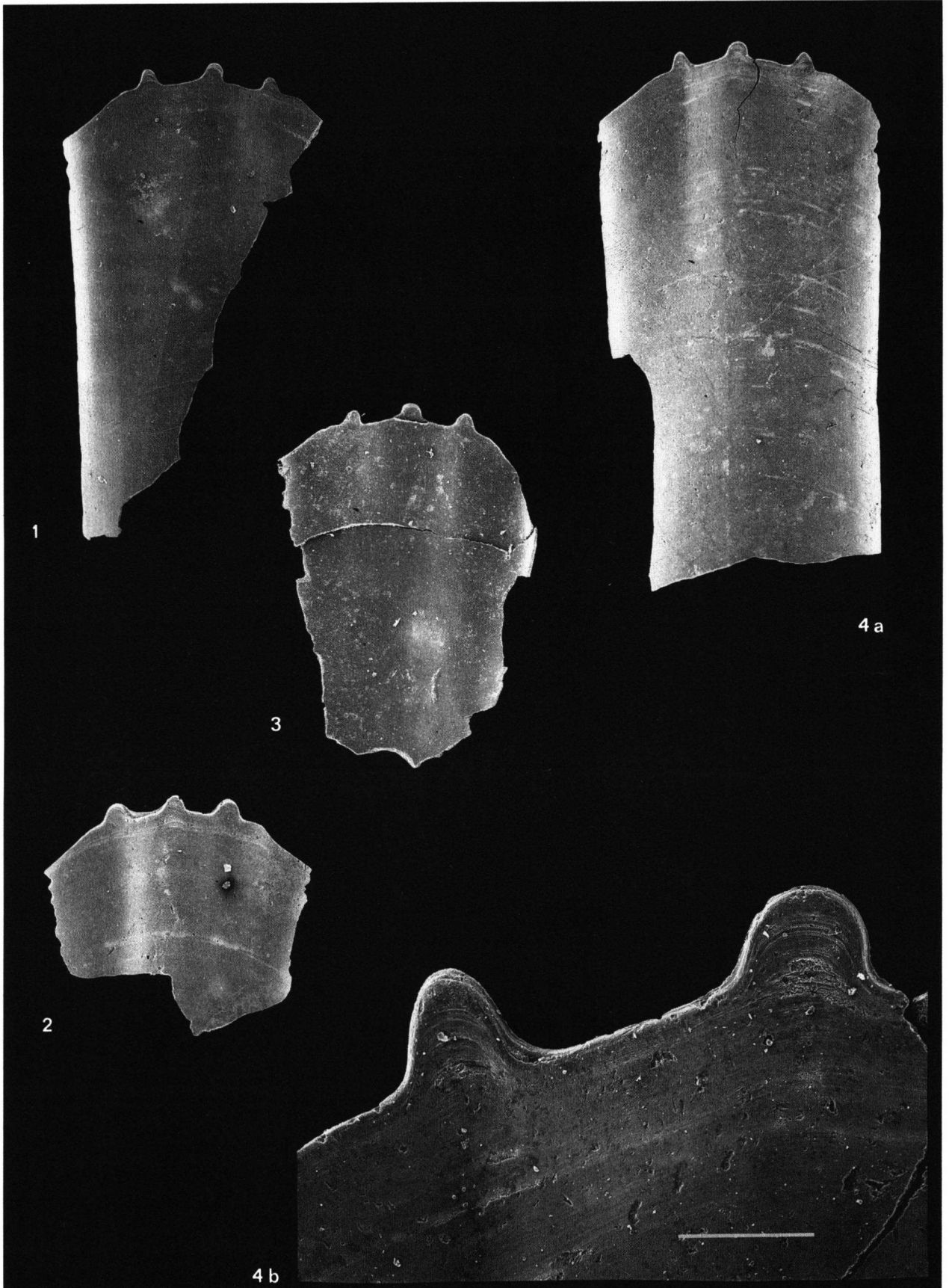


Plate 4

Vaginella tricuspidata sp. nov., paratypes

- Fig. 1. Apical shell fragment preserving larval shell, ventral view, RGM 229 951; 1a: x 40, 1b: x 120.
Figs 2, 3. Apical shell fragments preserving larval shell, lateral views, RGM 229 952-953; x 40.
Fig. 4. Fragment retaining ventral apertural margin, RGM 229 958; x 40.
Fig. 5. Fragment retaining ventral and dorsal apertural margins, apertural view, RGM 229 959; x 40.

? *Styliola* sp.

- Fig. 6. Fragment preserving larval shell, RGM 229 961; x 40.

PLATE 4

